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NEW SERIES, NO. 59

Systematics of Moths in the Genus *Catocala* (Lepidoptera: Noctuidae).

I. Type Material in the Strecker Collection, with Lectotype Designations

Lawrence F. Gall

David C. Hawks

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I. Type Material in the Strecker Collection, with Lectotype Designations

Lawrence F. Gall

*Entomology Division
Peabody Museum of Natural History
Yale University
New Haven, Connecticut 06511*

David C. Hawks

*Department of Entomology
University of California at Riverside
Riverside, California 92521*

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Systematics of Moths in the Genus *Catocala* (Lepidoptera: Noctuidae).

I. Type Material in the Strecker Collection, with Lectotype Designations

Abstract

The Strecker collection of *Catocala* at the Field Museum of Natural History was examined in order to clarify the taxonomic application of 38 names in this speciose noctuid moth genus. Herein, a total of 13 holotypes and 2 objective replacement names are discussed, and 23 lectotypes designated and illustrated.

Introduction

Ferdinand Heinrich Hermann Strecker (1836–1902) described hundreds of lepidopteran taxa in his productive and colorful lifetime, including 27 species and varieties of *Catocala* Schrank (1802). Strecker's contributions to *Catocala* systematics are central, as at least 14 of his names retain full species rank today, placing authorship on about one eighth of all the Nearctic *Catocala* species with him. Accordingly, in preparation for the *Catocala* fascicle for the "Moths of America North of Mexico" series, we visited the Field Museum of Natural History (FMNH) in Chicago, Illinois (USA), during January 1989, to examine the Strecker collection and address the remaining taxonomic issues involving his *Catocala* names.

Background Information

The Strecker Collection is currently housed adjacent to and separate from the other Lepidoptera

holdings at the Field Museum. The drawers in the Strecker cabinets are numbered consecutively. Within each drawer, a separate head label, in Strecker's writing, is usually pinned at the start of the series for each new taxon. For some taxa, secondary head labels occasionally appear within the series. The Strecker head labels are the primary sources of taxonomic and geographic information in the collection, as the specimens themselves bear only fragmentary label data, if any. When types are present within a series of specimens, Strecker's primary head label usually indicates this on its last line with the notation "(original Type)" or "(orig. Type)," or a closely similar phrase.

Although Strecker published in a broad array of scientific journals, his most important single work was the privately printed "Lepidopteres, Rhopaloceres and Heteroceres, Indigenous and Exotic; with Descriptions and Colored Illustrations" (hereinafter LRH). The LRH *sensu stricto* appeared in separate illustrated issues between 1872 and 1878, and all but 3 of Strecker's 27 *Catocala* names were published in this tome. Strecker subsequently published three nonillustrated Supplements to the LRH in 1898, 1899, and 1900, just prior to his death. The first two Supplements contain numerous descriptions of new taxa, but no *Catocala*. The third Supplement (hereinafter LRHS3) catalogues all of the lepidopteran type material in Strecker's collection, indicating the number of types, their type localities, and so forth.

We emphasize that the LRHS3 only claims to list types residing in Strecker's collection, not all of Strecker's types. Among the *Catocala*, for example, there are several Strecker types in the type cabinets at the American Museum of Natural History (AMNH), most of which are not tabulated in

TABLE 1. Synopsis of taxonomic actions taken in this article pertaining to names in the moth genus *Catocala* Schrank. AMNH = American Museum of Natural History, New York; FMNH = Field Museum of Natural History, Chicago. Note under the lectotype list that *Catocala mariana* Strecker and *Catocala mariana* Hy. Edwards are additionally both homonyms of *Catocala mariana* Rambur, the objective replacement name for *Catocala mariana* Hy. Edwards being *Catocala edwardsii* Kusnezov.

Taxon	Author	Date	Rank assigned in this paper	Change in rank	Location	Type locality
HOLOTYPE EXAMINED						
<i>aholiba</i>	Strecker	1874	full species	none	FMNH	Higher mountains of California, [USA]
<i>amestris</i>	Strecker	1874	full species	none	FMNH	[Dallas], Texas, [USA]
<i>cleopatra</i>	Hy. Edwards	1875	homonym of <i>cleopatra</i> Strecker (1874)	none	AMNH	Contra Costa County, California, [USA]
<i>dejecta</i>	Strecker	1880	full species	none	AMNH	[Nebraska, USA]
<i>edwardsii</i>	Kusnezov	1903	replacement name for <i>mariana</i> Hy. Edwards (1875)	none	FMNH	Vancouver Island, [British Columbia, Canada]
<i>eldoradensis</i>	Beutenmüller	1907	replacement name for <i>mariana</i> Hy. Edwards (1875)	none	FMNH	Vancouver Island, [British Columbia, Canada]
<i>faustina</i>	Strecker	1873	full species	none	FMNH	Arizona, [USA]
<i>herodias</i>	Strecker	1876	full species	none	FMNH	Bosque County, Texas, [USA]
<i>jocasta</i>	Strecker	1875	synonym of <i>messalina</i> Guenee (1852)	none	FMNH	Kansas, [USA]
<i>julietta</i>	French	1916	synonym of <i>junctura</i> Walker (1858)	none	FMNH	Carbondale, [Illinois, USA]
<i>magdalena</i>	Strecker	1874	synonym of <i>illecta</i> Walker (1858)	none	FMNH	Indianapolis, [Indiana, USA]
<i>myrrha</i>	Strecker	1874	synonym of <i>nuptialis</i> Walker (1858)	none	FMNH	[Dallas], Texas, [USA]
<i>sappho</i>	Strecker	1874	full species	none	FMNH	[Dallas], Texas, [USA]
<i>virens</i>	French	1886	synonym of <i>connubialis</i> Guenee (1852)	none	FMNH	[Carbondale, Illinois, USA]
<i>zoe</i>	Behr	1870	subspecies of <i>ilia</i> Cramer (1775)	none	FMNH	Searsville, [Napa County, California, USA]

TABLE 1. Continued.

Taxon	Author	Date	Rank assigned in this paper	Change in rank	Location	Type locality
LECTOTYPES DESIGNATED						
<i>agrippina</i>	Strecker	1874	full species	none	FMNH	[Dallas], Texas, [USA]
<i>aholah</i>	Strecker	1874	synonym of <i>similis</i> W. H. Edwards (1864)	none	FMNH	[Dallas], Texas, [USA]
<i>aspasia</i>	Strecker	1874	synonym of <i>junctura</i> Walker (1858)	new status	FMNH	Lower California, [USA or Mexico]
<i>atarah</i>	Strecker	1874	synonym of <i>micronympha</i> Guenee (1852)	none	FMNH	[Dallas], Texas, [USA]
<i>babayaga</i>	Strecker	1884	synonym of <i>jessica</i> Hy. Edwards (1877)	new synonymy	FMNH	Arizona, [USA]
<i>circe</i>	Strecker	1876	synonym of <i>coccinata</i> Grote (1872)	none	FMNH	Bosque Co[un]ty], Texas, [USA]
<i>cleopatra</i>	Strecker	1874	subspecies of <i>faustina</i> Strecker (1873)	new status	AMNH	Contra Costa County, California, [USA]
<i>delilah</i>	Strecker	1874	full species	none	FMNH	[Dallas], Texas, [USA]
<i>hippolytia</i>	Strecker	1874	full species	none	AMNH	San Mateo County, California, [USA]
<i>hippolytia</i>	Hy. Edwards	1875	homonym of <i>hippolytia</i> Strecker (1874)	none	AMNH	San Mateo County, California, [USA]
<i>jair</i>	Strecker	1897	full species	none	FMNH	Florida, [USA]
<i>judith</i>	Strecker	1874	full species	none	AMNH	West Farms, [Bronx], New York, [USA]
<i>luciana</i>	Strecker	1874	full species	none	AMNH	Colorado, [USA]
<i>luciana</i>	Hy. Edwards	1875	homonym of <i>luciana</i> Strecker (1874)	none	AMNH	Colorado, [USA]
<i>mariana</i>	Strecker	1874	synonym of <i>californica</i> W. H. Edwards (1864)	none	FMNH	Vancouver Island, [British Columbia, Canada]
<i>mariana</i>	Hy. Edwards	1875	homonym of <i>mariana</i> Strecker (1874)	none	FMNH	Vancouver Island, [British Columbia, Canada]
<i>obscura</i>	Strecker	1873	full species	none	FMNH	West Farms, [Bronx], New York, [USA]
<i>perditia</i>	Strecker	1874	synonym of <i>cleopatra</i> Strecker (1874)	none	FMNH	San Mateo County, [California, USA]
<i>perditia</i>	Hy. Edwards	1875	homonym of <i>perditia</i> Strecker (1874)	none	FMNH	San Mateo County, [California, USA]
<i>perplexa</i>	Strecker	1873	synonym of <i>partia</i> Guenee (1852)	none	FMNH	Brooklyn, N[ew] Y[ork], [USA]
<i>sara</i>	French	1883	synonym of <i>junctura</i> Walker (1858)	new status	FMNH	Jamestown, Colorado, [USA]
<i>ulalume</i>	Strecker	1877	full species	none	FMNH	[Dallas], Texas, [USA]
<i>zillah</i>	Strecker	1877	synonym of <i>faustina</i> Strecker (1873)	none	FMNH	Arizona, [USA]

TABLE 2. Label information for type specimens of moths in the genus *Catocala* Schrank discussed in this article. The nature of each label is indicated in brackets: m = machine printed, h = hand printed, ink color is black or dark brown unless otherwise noted. A machined LECTOTYPE label has also been affixed to each of the specimens designated herein as lectotype.

Taxon	Author	Date	Data labels attached to specimen
<i>agrippina</i>	Strecker	1874	"Dallas,/Texas." [m]
<i>aholah</i>	Strecker	1874	none
<i>aholibah</i>	Strecker	1874	none
<i>amestris</i>	Strecker	1874	"43." [h]; "Dallas,/Texas." [m]
<i>aspasia</i>	Strecker	1874	"aspasia" [h]; "Type" [h red]; "Catocala/aspasia/Type Strk./W. Beutenmüller/Nov. 22 1918." [h]
<i>atarah</i>	Strecker	1874	"134." [h]; "6 vi." [h]
<i>babayaga</i>	Strecker	1884	"male genitalia slide/C. babayaga Type/Field Museum/April 6, 1935/A. E. Brower." [h]
<i>circe</i>	Strecker	1876	none
<i>cleopatra</i>	Strecker	1874	"5670/California" [h]; "Type/cleopatra,/Hy. Edws." [m with h Type]; "No. 11892/Collection/Hy. Edwards." [m with h number]; "TYPE/No./A.M.N.H." [m red]
<i>dejecta</i>	Strecker	1880	"Neb." [m]; "Collection/G. D. Hulst" [m]
<i>delilah</i>	Strecker	1874	none
<i>faustina</i>	Strecker	1873	none
<i>herodias</i>	Strecker	1876	none
<i>hippolyta</i>	Strecker	1874	"48/Califa" [h]; "Type/hippolyta,/Hy. Edws." [m with h Type]; "No. 12647/Collection/Hy. Edwards." [m with h number]; "TYPE/No./A.M.N.H." [m red]
<i>jair</i>	Strecker	1897	"Fla." [m]
<i>jocasta</i>	Strecker	1875	"Kansas/(Original Type)" [h]
<i>judith</i>	Strecker	1874	"No. 493/Coll. J. Angus,/West Farms,/New York City." [m with h number]; "W. Farms/N.Y. 1888" [h with h "levettei" on back]; "Catocala/Judith/Type. Strk." [h]; "TYPE/No./A.M.N.H." [m]
<i>luciana</i>	Strecker	1874	"Colorado." [m]; "4407" [h]; "luciana,/Hy. Edws./Type" [m with h Type]; "No. 11759/Collection/Hy. Edwards." [m with h number]; "TYPE/No./A.M.N.H." [m red]
<i>magdalena</i>	Strecker	1874	none
<i>mariana</i>	Strecker	1874	"Vancouver/Island." [m]; "mariana/Hy. Edw." [h]; "C. mariana/Orig. Type. Hy. Edw./vide Lep Rhop Het p. 99/J.McD." [h]
<i>myrrha</i>	Strecker	1874	"11." [h]; "Dallas,/Texas." [h]
<i>obscura</i>	Strecker	1873	none
<i>perdita</i>	Strecker	1874	"perdita n.sp./Hy. Edwards./San Mateo Co./Orig. Type" [h]
<i>perplexa</i>	Strecker	1873	none
<i>sappho</i>	Strecker	1874	none
<i>sara</i>	French	1883	"Colo." [m]; "1" [h]; "F.M.N.H. Coll./No. 93/(Strecker Coll.)" [m with h number]; "C. sara/French/Type/vide Can. Ent. xiv 163/J.McD." [h]
<i>ulalume</i>	Strecker	1877	"109." [h]
<i>zillah</i>	Strecker	1877	none
<i>zoe</i>	Behr	1870	"Zoe. Behr/Napa Co." [h]

the LRHS3. Thus, in our opinion, the number of types stated in the LRHS3 cannot reliably be used alone as evidence as to the actual number of types for any given taxon authored by Strecker.

In working through the Strecker *Catocala*, we found the minutely detailed LRH illustrations to be by far the most useful tool for resolving taxonomic questions. Indeed, we were able to locate nearly all the type specimens easily with reference only to the LRH illustrations. Investigation of the LRH/LRHS3 texts and the various data labels typ-

ically offered additional confirmation. Note that the LRH text, the LRH figure captions, and the LRHS3 text sometimes disagree on the number of type specimens, and often on their sex. We always placed greatest faith in the LRH plates, preferring first to match the illustrations to actual specimens, and subsequently to address inconsistencies in the texts.

Strecker's archived correspondence at the Field Museum is doubtless his most voluminous and least utilized legacy. Included therein are over 10,000 incoming letters to him, and a scattering

of copies of his outgoing letters and other material (such as receipts for postal expenses). These archives were mostly untapped and, indeed, essentially untappable by the entomological community until 1987, when the Library staff at the Field Museum initiated the momentous task of unwrapping, sorting, and producing computerized catalogues to the holdings. At the time we visited the Field Museum in January 1989, nearly half the Strecker archives had been processed, with late 1989 being the target date for completion of the first phase of the project.

It would have proved nearly impossible to use the Strecker archives effectively for the present paper. This would have been premature in any event, as large gaps exist in even the already sorted material—the letters are in wrapped bundles that have remained tied since Strecker's day, with each bundle containing several dozen letters, and there is no predictable relationship among the letters present in any given bundle. We plan a sequel paper at a later date on Strecker and his *Catocala* dealings, based on his archived correspondence.

The following sections of this paper discuss, respectively, the 27 Strecker *Catocala* names, and 4 additional *Catocala* names authored by other workers for which types were located in the Strecker collection. Tables 1 and 2 provide a synopsis of all taxonomic decisions taken herein.

The Strecker *Catocala* Names

Catocala agrippina Strecker, 1874.

LRH, p. 95, Plate 11, Figs. 1–3; LRHS3, p. 35; 12 specimens in Drawer 34 at FMNH; head label with type information.

The three *agrippina* syntypes are pictured in the LRH, and were easily located in Drawer 34. One female *agrippina* syntype (LRH fig. 3) is a specimen of *Catocala atocala* Brou (1985), recently described as distinct but closely related to *agrippina*. In addition, two other *atocala*, one of each sex, are among the remaining nine non-syntype specimens labelled *agrippina*.

In his description of *atocala*, Brou did not address the presence of his new species among the Strecker *agrippina* syntypes. More inexplicable still, Brou (1985, p. 889) attributed the earliest published illustration of *atocala* to Barnes and McDunnough (1918), and claimed to have col-

lected the “first known females” of *atocala* between 1970 and 1984—Brou having overlooked not only the two Strecker females, but one other ancient female at the U.S. National Museum in Washington. Fortunately, usage of the name *agrippina* has always been consistent over time, *sensu* LRH Plate 11, Figures 1 and 2. Thus, we designate Strecker's illustrated male as LECTOTYPE for *agrippina* (our fig. 1). The type locality is [Dallas], Texas, [USA]. We recognize *Catocala agrippina* as a full species.

Catocala aholah Strecker, 1874.

LRH, p. 96, Plate 11, Fig. 8; LRHS3, p. 35; 6 specimens in Drawer 46 at FMNH; head label lacking type information.

The LRH description of *aholah* does not state the number of types; the LRHS3 indicates “one example, Dallas, Texas.” Only two specimens in Drawer 46 are referable to *aholah*—a male and female, each with no data label. Strecker's LRH description matches the male more closely than the female, although the figure caption asserts that the illustrated specimen is a female. We have chosen the male as LECTOTYPE for *aholah* (our fig. 2). The type locality is [Dallas], Texas, [USA]. *Catocala aholah* is a synonym of *Catocala similis* W. H. Edwards (1864).

Catocala aholibah Strecker, 1874.

LRH, p. 72, Plate 9, Fig. 5; LRHS3, p. 35; 12 specimens in Drawer 38 at FMNH; head label with type information.

Regarding *aholibah*, Strecker somewhat amusingly recounts “the single female example contained in the collection of Mr. James Behrens . . . who, in order to enable me to present the species, had the almost unprecedented generosity to rob his own fine cabinet of the only example it contained of this insect . . . [in flight the adult] was the wildest animal he ever saw.” Strecker's figured *aholibah* is therefore the holotype by monotypy. The first female in Drawer 38 bears no data label, but matches the LRH illustration exactly, and must be the holotype (our fig. 3). The type locality is “the higher mountains of California,” [USA], presumably referring to the Sierra Nevada. We recognize *Catocala aholibah* as a full species.



FIGS. 1-8. Holotypes and lectotypes of moths in the genus *Catocala* Schrank. Scale bar = 25 mm. 1, Lectotype, *agrippina* Strecker (1874). 2, Lectotype, *aholah* Strecker (1874). 3, Holotype, *aholibah* Strecker (1874). 4, Holotype, *amestris* Strecker (1874). 5, Lectotype, *aspasia* Strecker (1874). 6, Lectotype, *atarah* Strecker (1874). 7, Lectotype, *babayaga* Strecker (1884). 8, Lectotype, *circe* Strecker (1876).

***Catocala amestris* Strecker, 1874.**

LRH, p. 96, Plate 11, Fig. 6; LRHS3, p. 36; 3 specimens in Drawer 42 at FMNH; head label with type information.

The LRH description of *amestris* indicates "one example from Mr. J. Boll," with the LRHS3 text concurring. Strecker's illustrated female is therefore the holotype by monotypy (our fig. 4). The type locality is [Dallas], Texas, [USA]. We recognize *Catocala amestris* as a full species.

***Catocala aspasia* Strecker, 1874.**

LRH, p. 94; LRHS3, p. 36; 8 specimens in Drawer 41 at FMNH; head label with type information.

Strecker's *aspasia* has remained a *nomen dubium* from the time of its description—no illustration was given, and the textual diagnosis would politely be termed equivocal. Barnes and McDunnough (1918, p. 31) were unable to determine the whereabouts of the *aspasia* syntypes to their satisfaction, and so followed Beutenmüller in provisionally applying the name to Strecker's eight specimens under the head label *aspasia* (4 males, 3 females from Manitou, Colorado; 1 male, no locality data). Later authors have followed the Barnes and McDunnough treatment.

The eight specimens discussed by Barnes and McDunnough were still together in Drawer 41 when we visited the FMNH, and all are *Catocala junctura* Walker (1858). However, the male with no locality data now bears a red "type" label, and one male from Manitou now bears a red "cotype" label. Each of these two males also bears a label in Beutenmüller's handwriting as follows: "*Catocala/aspasia*/Type Strk./W. Beutenmüller/Nov. 22 1918."

Barnes and McDunnough's *Catocala* monograph was published in October, 1918. Thus, it would appear Beutenmüller either discovered additional evidence regarding the *aspasia* types following publication of the monograph, or had information prior to the publication to which Barnes and McDunnough were not privy (possible clues would almost certainly not have been included in the initial draft of the *Catocala* monograph, which was written by Beutenmüller and subsequently inherited by Barnes and McDunnough, who expanded on it).

The LRH gives "Lower California" as the type locality for *aspasia*, and the LRHS3 states "three

examples, Califa." This could refer either to California (USA) or Baja California (Mexico), and there are only two *Catocala* species occurring in these areas to which the name *aspasia* might apply: *jessica* Hy. Edwards (1877) and *junctura* (as noted above, the eight specimens labelled *aspasia* by Strecker are all *junctura*). Strecker described *babayaga* in 1884 as a distinct species, and discussed points of distinction between *babayaga* and *aspasia*. Because *babayaga* and *jessica* are conspecific, the name *aspasia* should logically apply to *junctura*, not *jessica*. Thus, we see no reason to challenge Beutenmüller's judgment of November 1918. Accordingly, we designate the Strecker male with no locality data, labelled "type" by Beutenmüller, as LECTOTYPE for *aspasia* Strecker (1874b; our fig. 5), and place the name hereinafter as a synonym of *junctura* (NEW STATUS). The type locality remains "Lower California" (either southern California, USA, or Baja California, Mexico).

***Catocala atarah* Strecker, 1874.**

LRH, p. 97, Plate 11, Figs. 10–11; LRHS3, p. 36; 33 specimens in Drawer 46 at FMNH; head label with type information.

The LRH pictures a male and female, and Strecker's description limits the syntype series to these two specimens. The illustrated male is the first specimen under the head label, and we have selected it as LECTOTYPE (our fig. 6). The type locality is [Dallas], Texas, [USA]. *Catocala atarah* is a synonym of *Catocala micronympha* Guenee (1852). We note that Strecker's 32 other "*atarah*" in Drawer 46 include: 26 *micronympha*, 2 *crataegi* Saunders (1876), 2 *blandula* Hulst (1884), 1 *mira* Grote (1876), and 1 *pretiosa* Lintner (1876).

***Catocala babayaga* Strecker, 1884.**

Papilio, 4: 73; 3 specimens in Drawer 39 at FMNH; head label with type information.

Strecker did not specify the number of types in his Papilio article; the LRHS3 indicates four from Arizona. The genitalia of one male have been dissected and mounted by Brower, and that specimen bears his handwritten label "male genitalia slide/*C. babayaga* Type/Field Museum/April 6, 1935/A. E. Brower." We therefore select this dissected male as LECTOTYPE for *babayaga* (our fig. 7). The type locality is Arizona, [USA]. The name

babayaga is a synonym of *Catocala jessica* Hy. Edwards (1877) (NEW SYNONYMY).

***Catocala coccinata* var. *circe* Strecker, 1876.**

LRH, p. 121; LRHS3, p. 35; 6 specimens in Drawer 36 at FMNH; head label lacking type information.

The four males and two females in Drawer 36 appear to constitute the syntype series, as the LRH mentions six specimens (the LRHS3 notes five specimens). None of the specimens bear data labels. We have selected the first male in the series as LECTOTYPE (our fig. 8). The type locality is Bosque Co[unty], Texas, [USA]. *Catocala circe* is a synonym of *Catocala coccinata* Grote (1872).

***Catocala cleopatra* Strecker, 1874.**

LRH, p. 99; LRHS3, p. 35; no specimens at FMNH; 1 specimen at AMNH.

The names *cleopatra*, *hippolyta*, *luciana*, *mariana*, and *perdita* were a source of contention between Strecker and Henry Edwards. Strecker validated all five names in 1874 on pp. 99–100 of the LRH, basing the descriptions upon specimens which Hy. Edwards sent to him—and which Hy. Edwards was also using as types. Hy. Edwards's descriptions of these same *Catocala* were still in manuscript in 1874; his paper was read to the California Academy in July 1875, and published later in the Academy's Proceedings. As a consequence, the five *Catocala* names that Hy. Edwards coined were unavailable to him by the time his intended original descriptions appeared in print.

Strecker does not state the number of his *cleopatra* types in either the LRH or LRHS3. Hy. Edwards's (1875) redescription of *cleopatra* lists a single male, implying a holotype by monotypy for his name. Barnes and McDunnough (1918, p. 24) considered the single male at the AMNH to "presumably . . . [be] a metatype" for *cleopatra* Hy. Edwards. This AMNH specimen bears an Hy. Edwards type label, in his handwriting, and we consider it to be his holotype. As no *cleopatra* head label exists in the Strecker collection, it seems probable that the AMNH male (and perhaps other specimens) served both Strecker and Hy. Edwards when they wrote their respective descriptions.

We therefore designate the AMNH male as LECTOTYPE for *Catocala cleopatra* Strecker (1874c;

see our fig. 9); the same specimen is the holotype of *Catocala cleopatra* Hy. Edwards (1875). The type locality is Contra Costa County, California, [USA]. We recognize *Catocala cleopatra* as a subspecies of *Catocala faustina* Strecker (1873a) (NEW STATUS).

***Catocala dejecta* Strecker, 1880.**

Bull. Brook. Ent. Soc., 2: 97; LRHS3, p. 35; 4 specimens in Drawer 47 at FMNH; head label lacking type information; 1 specimen at AMNH.

Strecker states that "the type of the species is in the collection of Rev. Geo. D. Hulst of Brooklyn." Pinned on the single male at the AMNH is a Hulst accession label, and one of Strecker's "original type" head labels indicating Nebraska as the collection locality (the LRHS3 states "2 examples NY," which are doubtless the "two corresponding [sic] specimens" to which Strecker refers in his 1880 article). The AMNH specimen thus is the holotype of *dejecta* by original designation (our fig. 10). The type locality is [Nebraska, USA], probably from the eastern portion of that state, where Juglandaceae-feeding *Catocala* species are taken regularly. We recognize *Catocala dejecta* as a full species.

***Catocala delilah* Strecker, 1874.**

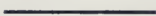
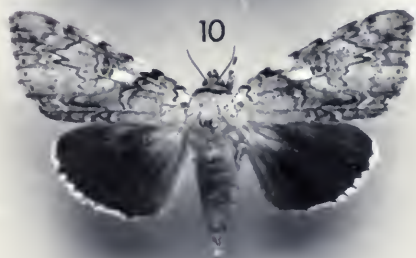
LRH, p. 96, Plate 11, Fig. 7; LRHS3, p. 36; 6 specimens in Drawer 45 at FMNH; head labels lacking type information.

The LRH description does not state the number of types. The LRHS3 indicates two specimens from Dallas County, Texas. The primary head label for Strecker's *delilah* reads "Tonganoxie Kansas," but a secondary head label reading "Dallas Co., Texas" precedes one of the males in the series. Thus, we have selected this male as LECTOTYPE for *delilah* (our fig. 11). The type locality is [Dallas], Texas, [USA]. We recognize *Catocala delilah* as a full species (see Hawks, 1986).

***Catocala faustina* Strecker, 1873.**

LRH, p. 21, Plate 3, Fig. 8; LRHS3, p. 35; 10 specimens in Drawer 39 at FMNH; head label with type information.

The single male *faustina* holotype (by original designation) was locatable on the basis of wing



FIGS. 9–16. Holotypes and lectotypes of moths in the genus *Catocala* Schrank. Scale bar = 25 mm. 9, Lectotype, *cleopatra* Strecker (1874). 10, Holotype, *dejecta* Strecker (1880). 11, Lectotype, *delilah* Strecker (1874). 12, Holotype, *faustina* Strecker (1873). 13, Holotype, *herodias* Strecker (1876). 14, Lectotype, *hippolyta* Strecker (1874). 15, Lectotype, *jair* Strecker (1897). 16, Holotype, *jocasta* Strecker (1875).

pattern and the manner in which it was pinned, as the LRH illustration exactly portrays the position of this specimen's wings (see our fig. 12). The type locality is Arizona, [USA]. We recognize *Catocala faustina* as a full species.

***Catocala herodias* Strecker, 1876.**

LRH, p. 121; LRHS3, p. 35; 1 specimen in Drawer 40 at FMNH; head label lacking type information.

The single female in Strecker's collection bears no data label, and the head label reads "Texas" on its last line. The forewing pattern of this female indicates it is from the western range of *herodias*, and it must be the holotype (by monotypy; our fig. 13). The type locality is Bosque County, Texas, [USA]. Oklahoman and Texan *herodias* represent the nominate subspecies. The distinctive disjunct subspecies found in the northeastern USA is *Catocala herodias gerhardi* Barnes and Benjamin (1927), and it may be worthy of full species status.

***Catocala hippolyta* Strecker, 1874.**

LRH, p. 99, LRHS3, p. 35; no specimens at FMNH; 1 specimen at AMNH.

Neither Strecker's nor Hy. Edwards's *hippolyta* descriptions state the number of types. Accordingly, we designate the single male in the AMNH as LECTOTYPE for both *Catocala hippolyta* Strecker (1874c) and *Catocala hippolyta* Hy. Edwards (1875; see our fig. 14). This specimen bears an Hy. Edwards type label. The type locality is San Mateo County, California, [USA]. We recognize *Catocala hippolyta* as a full species.

***Catocala jair* Strecker, 1897.**

Ent. News, 8: 116; LRHS3, p. 36; 3 specimens in Drawer 41 at FMNH; head label with type information.

Strecker's 1897 article lists 30 syntypes, the LRHS3 6. The three extant specimens at the FMNH are females with machined "Fla." labels, and our Figure 15 shows the LECTOTYPE selected from among these. The type locality is Florida, [USA]. We recognize *Catocala jair* as a full species.

***Catocala jocasta* Strecker, 1875.**

LRH, p. 107; LRHS3, p. 36; 11 specimens in Drawer 44 at FMNH; head label lacking type information.

The female described in the LRH is the holotype by original designation, and was readily locatable among the 11 specimens in Drawer 44 by its handwritten label "Kansas/(original type)" (see our fig. 16). The type locality is Kansas, [USA]. The name *jocasta* is a synonym of *Catocala messalina* Guenee (1852). The forewings of the *jocasta* holotype are quite dark, as are those of most *messalina* specimens from the northern parts of the species' range.

***Catocala judith* Strecker, 1874.**

LRH, p. 95, Plate 11, Fig. 5; 6 specimens in Drawer 35 at FMNH; head label lacking information; 2 specimens at AMNH.

The original description refers to two types, a male and female, in the collection of J. Angus in West Farms, New York. The male and female *judith* at the AMNH bear Angus's machined West Farms labels, and type labels in Strecker's handwriting. Because the head label in the Strecker collection does not say "original type" or an equivalent phrase, we give precedence to the AMNH material, and select the male from that institution as LECTOTYPE (our fig. 17). The type locality is West Farms, [Bronx], New York, [USA]. We recognize *Catocala judith* as a full species.

***Catocala luciana* Strecker, 1874.**

LRH p. 99; LRHS3, p. 35; no specimens at FMNH; 4 specimens at AMNH.

Neither Strecker nor Hy. Edwards states the number of types in their respective descriptions of *luciana*. Among the four specimens at the AMNH are a male and female each bearing an Hy. Edwards type label. We have selected the male as LECTOTYPE for both *Catocala luciana* Strecker (1874c) and *Catocala luciana* Hy. Edwards (1875; our fig. 18). The type locality is Colorado, [USA]. We recognize *Catocala luciana* as a full species. Three of the four AMNH specimens are indeed *luciana*, but the fourth is a specimen of *Catocala hermia* Hy. Edwards (1880).



FIGS. 17–24. Holotypes and lectotypes of moths in the genus *Catocala* Schrank. Scale bar = 25 mm. 17, Lectotype, *judith* Strecker (1874). 18, Lectotype, *luciana* Strecker (1874). 19, Holotype, *magdalena* Strecker (1874). 20, Lectotype, *mariana* Strecker (1874). 21, Holotype, *myrrha* Strecker (1874). 22, Lectotype, *obscura* Strecker (1873). 23, Lectotype, *perdita* Strecker (1874). 24, Lectotype, *perplexa* Strecker (1873).

***Catocala magdalena* Strecker, 1874.**

LRH, p. 93, Plate 11, Fig. 9; LRHS3, p. 36; 1 specimen in Drawer 43 at FMNH; head label with type information.

Strecker initially described *magdalena* on p. 93 of the LRH. He illustrated the female from which he based the description on Plate 11 several months later, and added further discussion on p. 97 that indicates this female is the holotype by monotypy (our fig. 19). The type locality is Indianapolis, [Indiana, USA]. *Catocala magdalena* is a synonym of *Catocala illecta* Walker (1858).

***Catocala mariana* Strecker, 1874.**

LRH, p. 99; LRHS3, p. 35; 11 specimens in Drawer 39 at FMNH; head label with type information; 1 specimen at AMNH.

Neither Strecker nor Hy. Edwards stated the number of types on which they based their respective *mariana* descriptions. Among the 11 specimens in Strecker Drawer 39 under the *mariana* head label is a single male, bearing the following label in McDunnough's handwriting: "C. mariana/Orig. Type. Hy. Edw./vide Lep Rhop Het p. 99/J.McD." We designate this specimen as LECTOTYPE for *Catocala mariana* Strecker (1874c; our fig. 20). The type locality is Vancouver Island, [British Columbia, Canada]. The male *mariana* at the AMNH bears a machined Vancouver Island label, and one of Hy. Edwards's handwritten type labels. This AMNH specimen would appear to be an available syntype, but for parsimony's sake, we also choose to designate the lectotype for *Catocala mariana* Strecker (1874c) as the LECTOTYPE for *Catocala mariana* Hy. Edwards (1875).

Both *Catocala mariana* Strecker and *Catocala mariana* Hy. Edwards are primary junior homonyms of *Catocala mariana* Rambur (1866) from the Palearctic. The first published objective replacement name for *Catocala mariana* Hy. Edwards is *Catocala edwardsii* Kusnezov (1903); the second published, and hence unnecessary, replacement name is *Catocala eldoradensis* Beutenmüller (1907). The specimen shown in our Figure 20 is therefore the name-bearing type for both *Catocala edwardsii* and *Catocala eldoradensis*. At present, we feel that *Catocala edwardsii* and *Catocala francisca* Hy. Edwards (1880) are probably synonyms of *Catocala californica* W. H. Edwards (1864), but

the taxonomy of the dark-forewinged western Nearctic *Catocala* is not yet fully resolved.

***Catocala myrrha* Strecker, 1874.**

LRH, p. 97, Plate 11, Fig. 12; LRHS3, p. 36; 4 specimens in Drawer 44 at FMNH; head label with type information.

Strecker's head label for *Catocala nuptialis* Walker (1858) bears "*Catocala myrrha* Strecker" parenthetically as its second line, suggesting that Strecker may have later realized the synonymy of his *myrrha*. The same head label reads "Lawrence, Kansas" on its last line. Three males in Drawer 44 bear no data labels, whereas the single female has two handwritten labels "11." and "Dallas, Texas." The figured LRH specimen is the holotype by monotypy, and although the LRH figure caption claims the illustration is of a male, we feel the female bearing the data label is indeed the holotype (our fig. 21). The type locality is [Dallas], Texas, [USA]. *Catocala myrrha* is a synonym of *Catocala nuptialis*.

***Catocala obscura* Strecker, 1873.**

LRH, p. 19, Plate 3, Fig. 4; LRHS3, p. 35; 12 specimens in Drawer 34 at FMNH; head label with type information.

The LRH description does not indicate the number of *obscura* types; the LRHS3 states five. The 12 specimens in Drawer 34 include 6 *obscura* and 6 *residua* Grote (1874), and none of these bears a data label. The *obscura* are pinned together in one series immediately under the head label, and the *residua* follow in another series. It seems likely that the *obscura* pinned together constitute all or part of the original syntype series, and so we have selected a male from among them as LECTOTYPE for *obscura* (our fig. 22). The type locality is West Farms, [Bronx], New York, [USA]. We recognize *Catocala obscura* as a full species, closely related to but clearly distinct from *Catocala residua*.

***Catocala perdita* Strecker, 1874.**

LRH, p. 100; LRHS3, p. 35; 1 specimen in Drawer 38 at FMNH; head label with type information; 2 specimens at AMNH.

*Catocala perdit*a is the last of the five names authored by both Strecker and Hy. Edwards. The LRH does not state the number of types for Strecker's *perdit*a; the LRHS3 indicates one. Hy. Edwards's (1875) paper similarly does not give the number of types for his *perdit*a. Both Strecker and Hy. Edwards list San Mateo County, [California, USA] as the type locality for *perdit*a, and so the two males in the AMNH type cabinet bearing Mendocino County labels are unlikely to be syntypes. Thus, we designate the single male in the Strecker collection as LECTOTYPE for both *Catocala perdit*a Strecker (1874c) and *Catocala perdit*a Hy. Edwards (1875; our fig. 23), and place *perdit*a as a synonym of *cleopatra* Strecker.

***Catocala parta* var. *perplexa* Strecker, 1873.**

LRH, p. 38, Plate 5, Fig. 11; 1 specimen in Drawer 36 at FMNH; head label with type information.

The LRH description indicates two syntypes. We designate the single female in Strecker's collection as LECTOTYPE for *perplexa* (our fig. 24). The type locality is Brooklyn, N[ew] Y[ork, USA]. *Catocala perplexa* is a synonym of *Catocala parta* Guenee (1852).

***Catocala sappho* Strecker, 1874.**

LRH, p. 95, Plate 11, Fig. 4; LRHS3, p. 35; 2 specimens in Drawer 35 at FMNH; head label lacking type information.

Strecker based his description of *sappho* on a single female, it being the holotype by monotypy. The holotype was readily located in Drawer 35 from the LRH illustration (our fig. 25). The type locality is [Dallas], Texas, [USA]. The unlabelled male in Drawer 35 is the smaller and less contrasting form of *sappho* typically encountered outside Florida and the immediate Gulf coast, which may explain the "Georgia" head label. We recognize *Catocala sappho* as a full species.

***Catocala ulalume* Strecker, 1877.**

LRH, p. 132; LRHS3, p. 35; 2 specimens in Drawer 33 at FMNH; head label with type information; 1 specimen at AMNH.

The LRH description gives no indication of the number of types; the LRHS3 states two males. The two males in Strecker Drawer 33 bear handwritten labels "108." and "109." respectively. The male from Texas in the AMNH is from Hulst's collection, and on its pin is what appears to be another primary Strecker head label for *ulalume*. We give precedence here to Strecker's material, and hence designate his male numbered "109." as the LECTOTYPE for *Catocala ulalume* (our fig. 26). The type locality is [Dallas, Texas, USA]. We recognize *Catocala ulalume* as a full species.

***Catocala faustina* var. *zillah* Strecker, 1877.**

LRH, p. 129; LRHS3, p. 35; 1 specimen in Drawer 39 at FMNH; head label with type information.

The original LRH description indicates "several examples," and the LRHS3 indicates one male type. A single male *zillah* is present under the head label, and so we designate this specimen as the LECTOTYPE (our fig. 27). The type locality is Arizona, [USA]. *Catocala zillah* is a synonym of *Catocala faustina* Strecker.

Other *Catocala* Types in the Strecker Collection

We located types at the FMNH for four additional Nearctic *Catocala* authored by workers other than Strecker. Two of the names involve holotypes by monotypy, and we did not consider it necessary to discuss these in detail, the names being: *Catocala amasia* var. *virens* French (1886), a synonym of *Catocala connubialis* Guenee (1852); and *Catocala julietta* French (1916), a synonym of *Catocala junctura*. The other two names require lectotypes and/or further discussion, and follow forthwith:

***Catocala sara* French, 1883.**

Can. Ent., 15: 163; 1 specimen in Drawer 40 at FMNH; head label with type information.

French described *Catocala sara* from "two specimens from Jamestown, Colorado, one in my own cabinet and one in the cabinet of Hermann Streck-



FIGS. 25-29. Holotypes and lectotypes of moths in the genus *Catocala* Schrank. Scale bar = 25 mm. 25, Holotype, *sappho* Strecker (1874). 26, Lectotype, *ulalume* Strecker (1877). 27, Lectotype, *zillah* Strecker (1877). 28, Lectotype, *sara* French (1883). 29, Holotype, *zoe* Behr (1870).

er." The Strecker specimen is a female, which we here designate as **LECTOTYPE** for *sara* (our fig. 28). The type locality is Jamestown, Colorado, [USA]. *Catocala sara* is a synonym of *Catocala junctura* Walker (**NEW STATUS**).

***Catocala zoe* Behr, 1870.**

Trans. Amer. Ent. Soc., 3: 24; 4 specimens in Drawer 41 at FMNH; head label with type information.

Behr's holotype (by monotypy) was reared *ex larva* from "beneath a clump of trees composed of *Quercus lobata*, *Alnus viridis*, and a species of Willow," the oak obviously being the appropriate host. The Strecker specimen is a female, and bears a label "Zoe. Behr/Napa Co." in Behr's handwriting. We presume this specimen to be the holotype (our fig. 29). The type locality is Searsville, [Napa County, California, USA]. We presently recognize *zoe* as a subspecies of *Catocala ilia* Cramer (1775).

The types for the three *Catocala* authored by Behr (1870)—*zoe*, *irene*, *stretchii*—have been treated as lost by recent workers, probably on the basis of Barnes and McDunnough's (1918) statements that the *irene* type was "since destroyed" and the *stretchii* type "lost." However, in a brief foray into Strecker's archives, Brown (1968) came across a letter from Behr to Strecker implying that Behr's *Catocala* types had been sent to Strecker. Because we have uncovered no other information yet as to where Behr's *Catocala* types might be, we see no reason to doubt Brown's suggestion, particularly given the label data associated with the FMNH *zoe* specimen. A future search of the nearly computerized Strecker correspondence files may offer further insight into the disposition of Behr's types.

Acknowledgments

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